SOLOW'S GROWTH MODEL

- The steady state level of capital and how savings affects output and economic growth

- Previous models such as the closed economy and small open economy models provide a static view of the economy at a given point in time.
- The Solow growth model allows us a dynamic view of how savings affects the economy over time.

- We begin with a production function and assume constant returns.

$$Y=F(K,L) \quad \text{so...} \quad zY=F(zK,zL)$$

- By setting $z=1/L$ we create a per worker function.

$$Y/L=F(K/L,1)$$

- So, output per worker is a function of capital per worker. We write this as,

$$y=f(k)$$

- We begin with per worker consumption and investment. (Government purchases and net exports are not included in the Solow model).
- This gives us the following per worker national income accounting identity.

  $y = c+I$
- Given a savings rate (s) and a consumption rate (1–s) we can generate a consumption function.

  $c = (1–s)y$ …which makes our identity,

  $y = (1–s)y + I$ …rearranging,

  $i = s*y$ …so investment per worker equals savings per worker

- Given s, δ, and initial k, we can compute time paths for our variables as we approach the steady state.
- Let's assume s=.4, δ=.09, and k=4.
- To solve for equilibrium set $s*f(k)=\delta k$. This gives us $.4*k^{1/2}=.09*k$. Simplifying gives us k=19.7531, so k*=19.7531.

conclusion

- The Solow Growth model is a dynamic model that allows us to see how our endogenous variables capital per worker and output per worker are affected by the exogenous variable savings. We also see how parameters such as depreciation enter the model, and finally the effects that initial capital allocations have on the time paths toward equilibrium.
- In the next section we augment this model to include changes in other exogenous variables; population and technological growth.

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